# THE FREQUENCY OF RENAL DISEASE AMONG THE INSANE.

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IN the hope of obtaining some statistical facts regarding the prevalence of renal disease among the insane, and of ascertaining the general status, among American alienists, of the "Bright's Disease and Insanity" question, I recently asked of the superintendents of a number of insane hospitals in the United States, brief replies to the interrogatories which, together with the answers received, are given in condensed tabular form below. Some of the institutions addressed avowed an inability to return even approximate statements, and are of necessity omitted from the table. The replies are numbered and names withheld. (See pages 813 and 814.)

So far as indicating the frequency of disease of the kidneys is concerned, the figures reported are, with a few exceptions, of manifestly little value, owing to the want of systematic observation and the very general neglect of the chief diagnostic means at our disposal for the detection of this disease. However, a not unimportant lesson may be gathered therefrom by those who read between the lines and compare, for instance, the results obtained at two large hospitals in the same State, one reporting (No. 10 in table) that urinary examinations are made in every case at time of admission; that in "at least one-half" of these albumen and casts are discovered; and that of the nine hundred patients under treatment "probably one-half" exhibit a nephritic complication of some kind, the other institution (No. 29) resorting to urinalysis in suspected cases only and making the statement that among an insane population of more than eight hundred not one case of renal disease is

TABLE I.

| | Number of patients under treatment? | Number (or approximation thereto) known to be suffering from "Bright's Disease" in any of its forms? | Is the urine of every patient examined at time of admission? If so, in what proportion is evidence (albumen and casts) of a nephritic complication found? | Do you recognize a causal relation between renal disease and mental alienation? | What form of insanity is, in your experience, most often associated with Bright's Disease? |
|---|---|---|---|---|---|
| 1 | 262 | Three. | No. | A not infrequent coincidence, but not a distinctly causal relation. | Have met with it in various forms of insanity. |
| 2 | 1350 | A small proportion. | No. | Yes. | Melancholia. |
| 3 | 150 | None. | No. | Have had no cases where history indicated such relation. | |
| 4 | 658 | None. | No. | No. | Am unprepared to say. |
| 5 | 184 | Very few; probably five. | Urine examined; albuminuria rarely found. | No; both conditions have common cause. | General paralysis. |
| 6 | 264 | Ten per cent. | No; unless some indication of renal weakness. | Yes. | Melancholia, stuporous insanity and dementia. |
| 7 | 264 | None. | Only when mental trouble is suspected. | I do not. | Have no experience. |
| 8 | 367 | None. | Urine is not examined unless some symptoms indicate disease of kidneys or bladder. | I have not as yet. | |
| 9 | 40 | None. | Test is usually made, but not in every case. | I have not. | |
| 10 | 926 | Probably one half. | Yes. Albumen and casts in at least one half. | Yes. | Melancholia. |
| 11 | 845 | Four. | No. Examination only made to verify diagnosis when sugar or albumen is suspected. | Do not. | Melancholia. |
| 12 | 212 | None. | No. Unless some indication. | Yes. | |
| 13 | 70 | None. | Only suspicious cases examined. | Yes. | Melancholia. |
| 14 | 520 | Probably three. | No. | I have thought so. | I have observed both mania and melancholia. |
| 15 | 431 | One. | Not examined in absence of symptoms suggesting renal disease. | In some cases. | No uniformity, in my experience. |
| 16 | 240 | None. | No. | No. | |
| 17 | 862 | Five or six. | Only when symptoms suggest the possibility of nephritic trouble. | Yes. | Various forms of melancholia, also certain forms of brain degeneration dependent upon vascular changes. |
| 18 | 878 | Five. | Only when nephritis is suspected. | Not any more than any other bodily disease. | Dementia. |

TABLE I.—(*Continued.*)

| | Number of patients under treatment? | Number or (approximation thereto) known to be suffering from "Bright's Disease" in any of its forms? | Is the urine of every patient examined at time of admission? If so, in what proportion is evidence (albumen and casts) of a nephritic complication found? | Do you recognize a causal relation between renal disease and mental alienation? | What form of insanity is, in your experience, most often associased with Bright's Disease? |
|---|---|---|---|---|---|
| 19 | 435 | None. | Many, but not all. | Sometimes; more often mal-nutrition of tissue produces disease of kidneys. | Acute delirious mania. Disease of kidneys common at autopsies of insane. |
| 20 | 370 | None. | No. | Have not noticed it. | I do not know. |
| 21 | 10 | None. | No. Unless indicated. | No. | No especial form. |
| 22 | 340 | None. | No; only when disease is suspected. | No. | |
| 23 | 433 | Six. | No. | Yes. | Mania of a delirious type—active delusions. |
| 24 | 622 | None. | No. | | No cases of apparent relation have come under my observation. |
| 25 | 1926 | About one hundred. | No. | No. | No especial form observed. |
| 26 | 600(?) | None. | No. | No. | |
| 27 | 1600 | Post - mortem examinations show some renal disease in a majority of cases. | No. | No. | I do not know that nephritis is diagnostic of any special form of insanity, or that there is any necessary connection between them. |
| 28 | 989 | Acute nephritis rare; chronic renal disease common. | No. | Mental alienation in these cases almost invariably due, as is the renal disease, to the degenerative changes in the arteries. | Those forms due to atheromatous degeneration of the arteries. |
| 29 | 810 | None. | Only when disease of the kidney is suspected. | No. | Have not seen enough to enable me to decide. |
| 30 | 756 | Two. | No. | Have seen none. | No especial form. |
| 31 | 1048 | None. | Where disease is suspected. | | |
| 32 | 875 | Four. | No. | Not certainly. | Have no opinion. |
| 33 | 841 | About one per cent. | No. | In some instances. | With acute nephritis, acute confusional insanity, with chronic renal disease, chronic or recurrent mania, melancholia, and secondary dementia. |
| 34 | 275 | None. | No. | Have no opinion. | |
| 35 | 240 | Seven. | Yes. About six per cent. | Only as a predisposing cause. | Undecided. |
| 36 | 332 | Probably six. | Is not. | Yes. | Different forms. |
| 37 | 165 | One. | No. | Have noted no relation. | Dementia. |
| 38 | 383 | None. | No. | No. | |
| 39 | 266 | None. | No. | | |

known. For an explanation of the discrepancy one has not far to seek.

Every recent writer who has made any study of the subject—especially to be mentioned, Dr. E. A. Christian,[1] at the Eastern Michigan Hospital, Dr. Alice Bennett,[2] of Norristown, and Dr. G. T. Tuttle,[3] of the McLean Asylum—has reached the conclusion that "Bright's disease" is very common among the insane, and is in some cases directly responsible for the perverted brain action. Though much has been accomplished by these workers it is still evident that the matter is not receiving at the hands of the medical corps of our institutions for the treatment of the insane that attention which its far-reaching importance would seem to merit.

Prior to the time of systematic autopsies with consequent exposure of diagnostic errors, and the routine examination of the urine in every case received for treatment, whether renal disease was suspected or not, the state of the question at the Alabama Insane Hospital was much as shown by the above table. We resorted to urinalysis when indicated—which was rarely—we recognized the well-marked and typical cases of nephritis only, and for some years treated headaches, "dyspepsia," diarrhœa, insomnia, general mal-nutrition, etc., in serene ignorance of the real source of the trouble. We regarded renal disease of any kind as rare among insane populations, and found ample confirmation of this erroneous opinion in every text-book accessible to us. Our views have undergone a radical change, and I feel justified in emphasizing the statement that disease of the kidney is far and away the most common phase of physical weakness to be found within the walls of our institution. Of the eleven hundred patients under treatment, surely one-half present indubitable evidence of a renal lesion. About 60 per cent. of the recent admissions show casts and albumen, and of these 60 per cent. the immense majority give such additional confirmatory evidence as fully warrants their classification under some one of the various forms of the "Morbus Brightii." Quite three-fourths of those who die exhibit at least a complicating degree of nephritic disease, with demonstrable anatomical changes.

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[1] Chronic Bright's Disease in its Relations to Insanity: Journal of American Medical Association, March 23, 1889.

[2] Insanity as a Symptom of Bright's Disease: Alienist and Neurologist, October, 1890.

[3] Kidney Disease and Insanity: American Journal of Insanity, April, 1892.

In the subjoined table are given the results, as to presence of albumen and casts, of the first examination of the urine in 1,034 insane patients. In view of the high percentage of disease indicated, and the somewhat different results obtained by other investigators, I will briefly state that the tests for albumen employed have been:

1° Heat and nitric acid, Tyson's method.
2° Picric acid, in form of "Esbach's solution."
3° Heller's cold acid test (contact).
4° Acetic acid—ferrocyanide of potassium.
5° Robert's nitric-magnesian fluid (contact).

Used with all due precaution in every case. In no instance has a diagnosis of albumen been made from a single test. Most generally three of the above have been used. No distinction has been drawn between serum-albumen and the other proteid bodies—globulin, albumose, etc.—precipitated by the tests enumerated. In a majority of the cases glucose, indican and acetone have been looked for, and, in some, quantitative estimates of the urea, phosphates, chlorides, etc., made, but these having no bearing upon the subject immediately in hand are omitted from the table, as is also any mention of the sedimentary constituents other than renal casts. (See page 817.)

As stated, the figures are based upon results of the first examination only. In a large percentage of the cases, however, the analysis has been repeated, and about one-half of the patients have been under continuous observation, urinary examinations being made at intervals and, in especial cases, a daily record kept. The outcome of such subsequent examinations has been an increase in the number of those showing both casts and albumen, the non-appearance of one or both of these constituents at a second analysis being more than overbalanced by constant additions from among those patients in whom the first test proved negative in whole or in part. In a certain number of cases of "contracted kidney," the finding of casts, even with the most painstaking search, is the exception, and some of these—patients in whom the constitutional symptoms, with the pale urine of low specific gravity and largely increased quantity are markedly present—are included among those showing either no albumen and no casts, or albumen alone. The question of the significance of albumen and casts arises in this connection, but cannot be discussed at length within the limits of this paper. No one will, I suppose, contend that these abnormal products are thrown off from normal kidneys, and the generally accepted belief that the constant presence of albumen and casts in the urine is *prima facie* evidence of disease finds confirmation in the fact that the great majority—all, I may say, with very few exceptions—of our patients exhibiting the urinary signs show such other symptoms

TABLE II.—SHOWING OCCURRENCE OF ALBUMEN AND CASTS IN THE URINE OF 1,034 INSANE PATIENTS.

| | | WHITE. | | COLORED. | |
|---|---|---|---|---|---|
| | TOTAL. | MEN. | WOMEN. | MEN. | WOMEN. |
| Both casts and albumen found. . | 561 | 204 | 229 | 56 | 72 |
| Casts found ; no albumen . . . . | 121 | 48 | 40 | 24 | 9 |
| Albumen found; no casts . . . . | 200 | 80 | 78 | 13 | 29 |
| Neither casts nor albumen found. | 152 | 53 | 38 | 29 | 32 |
| Total number of examinations. . | 1034 | 385 | 385 | 122 | 142 |

as amply confirm the diagnosis. It is interesting to note that the percentage of disease indicated is somewhat smaller among the negroes than among the white patients, and that the women of both races, contrary to the opinion expressed by most writers, exhibit an amount of renal weakness visibly in excess of that found in the opposite sex. A certain proportion of the cases of nephritis we have had on our wards have been acute in character, progressing to recovery, death, or ending in a chronic lesion, but by far the larger number have pursued a typically chronic course from the time they came under notice. Among these chronic forms those associated with arterial degenerative change seem especially frequent, though all the varieties of kidney disease find their representatives among our cases.

The appended statement of the condition of the kidneys at twenty-five consecutive necropsies will suffice to show in a general way the frequency of characteristic structural alterations, and serve as evidence corroborative of the opinion, above expressed, that fully one-half of the cases of insanity coming under observation have a complicating renal lesion. The examination has on every occasion been made as soon as practicable after death, with the purpose of measurably eliminating those changes in the epithelial cells due to decomposition. For microscopic study sections of both kidneys have been used in each and every case, though the organs are spoken of as one, unless there exists a marked structural difference on the two sides. The hardening agents employed have been Müller's fluid (potassium bichromate), Fleming's fluid (osmic acid), and in some instances dilute alcohol. Cutting and staining by the usual methods.

CASE I.—Negro, man, æt. 70; senility, with maniacal excitements; died in stupor.

*Autopsy.*—Cerebral atrophy; small tubercular nodules in apex of left lung; liver and spleen firm and small; heart weighs 5¾ ozs. Kidneys: Soft, red; capsule adherent; cortex thinned; medullary rays obscured; some of the pyramids very pale; weight of right 2½, of left 2¾ ozs. Microscopical examination: Uniform thickening of capsule; patches and bands of interstitial thickening and round-cell infiltration numerous and large; thickening of Bowman's capsule and afferent vessels; thickening of walls of all the arteries, intima particularly involved; epithelial cells show some disintegration and granular cloudiness; many tubules contain casts (hyaline).

CASE II.—Female, white, æt. 40; insane ten years; melancholia, passing into dementia; tuberculosis pulmonum, and no symptoms of renal weakness save œdema of feet for a short period some months before death; the urine generally contained no albumen, but a few hyaline and faintly granular casts were the rule.

*Autopsy.*—Cerebral atrophy; tuberculosis of lungs and tubercular ulcers in small intestine; weight of heart 6⅜ ozs. Kidneys: Capsule non-adherent and gross appearance approximately normal; weight of right 3½, of left 4 ozs. Microscopical examination: Epithelial cells in some of the convoluted tubes are granular and swollen; a little *débris* and a few casts in situ; no further change.

CASE III.—Male, white, æt. 74; senile dementia; death preceded by apopletic symptoms.

*Autopsy.*—Cerebral atrophy; extensive subdural hemorrhage. Heart: Brown atrophy; weight 6¼ ozs.; arterial sclerosis well marked. Kidneys: Capsule slightly adherent; numerous cysts in the thinned cortex; striæ obscured; weight of right 2¾, of left 3 ozs. Microscopic examination: Localized thickening of the capsule, extensive patches of interstitial thickening, capsules of a few tufts thickened, afferent vessels thickened, large hyaline casts in situ, and cloudy swelling and some disintegration of epithelial cells.

CASE IV.—Female, white, æt. 62; opium habit thirty-two years, with gradual impairment of intelligence; for several years presented a rather typical case of chronic nephritis with œdema, gastro-intestinal disorder, etc. Death preceded by somnolence, gradually deeping into coma; urine contained much albumen and great numbers of casts—hyaline, granular, nucleated and fatty.

*Autopsy.*—Œdema of brain, lungs, cellular tissue, chronic pericarditis, chronic endocarditis (mitral and aortic valves involved), chronic diffuse endarteritis (atheroma of cerebral arteries); weight of heart 10¾ ozs.; fatty infiltration of liver. Kidneys: Firm, pale; capsule readily removed, but leaves an extremely irregular, knobby surface; cortex pale yellow; striæ obscured; pyramids dark red; right weighs 4½, left 4⅛ ozs. Miscrocopical examination: Extensive patches of intertubular thickening with destruction of Malpighian tufts in same area; walls of all arteries thickened; epithelial cells much broken down, granular, swollen, many tubules choked with *débris*, and some contain casts in situ.

Case V.—Female, white, æt. 50; epileptic convulsions for twenty-seven years, and during the latter half of this time dementia with periods of excitement; chronic nephritis, terminating in somnolence, coma and death, urine contained albumen, hyaline and granular casts; and was usually increased in quantity.

*Autopsy.*—No disease save that of kidneys. These organs are soft and pale, the capsule adheres in places and remaining surface is granular. Cortex is thinned, and its markings are indistinct. Pyramids dark, striated. Right weighs 4¼, left 4½ ozs. Microscopical examination: Patches of intertubular thickening and round cell infiltration. Total destruction of many Malpighian tufts, and general thickening of capsules of those remaining. Secreting cells granular and broken; some tubules almost denuded of epithelial lining. With iodine and gentian violet a slight amyloid reaction is obtained in some tufts and around some of the blood-vessels.

Case VI.—Negro woman, æt. 37; chronic melancholia with delusions; died of tuberculosis. No nephritic symptoms. Urine contained a trace of albumen and some hyaline and faintly granular casts.

*Autopsy.*—Tuberculosis of lungs, pleural, small intestine, lymph glands, liver, spleen and uterus. Kidneys: Pale, soft; capsule non-adherent; cortical tissue thinned; medullary rays obscured; pyramids dark, striated. Weight of right 4⅛, of left 4 ozs. Microscopical examination: "Cloudy swelling" of glandular epithelium. Vessels, tufts and intertubular tissue normal. A few casts in the tubules. No tubercular nodules discovered.

Case VII.—Female, colored, æt. 44. Insane many years, and much demented. Had a chronic nephritis. Urine contained albumen and casts—hyaline, waxy, fatty, granular. Somnolence and stupor preceding death.

*Autopsy.*—Cerebral atrophy. Bodily organs normal, save the kidneys, which are soft, dark; have partially adherent capsules, and a much thinned cortex. Striæ indistinctly visible. Pyramids very dark. Weight of right 5, of left 4¾ ozs. Microscopical examination: Capsule shows localized thickenings. Small areas of intertubular hyperplasia and round-celled infiltration. Slight thickening of arterial walls. Tubal epithelium shows a high degree of degenerative change, and is broken down and converted into cast matter in many tubules. Casts in situ very numerous.

CASE VIII.—Female, white, æt. 28. Insane ten years—melancholia with delusions, passing into dementia. Tuberculosis pulmonum, with, in later stages, œdema of face and lower extremities. Urine contained albumen and hyaline and granular casts.

*Autopsy.*—Tubercular disease of lungs and small intestine. Chronic adhesive pericarditis. Weight of heart 7¼ ozs. Kidneys: Capsule does not adhere. Cortex is pale, its striations obscured. Pyramids dark. A small cyst in right. Weight of right 4, of left 4½ ozs. Microscopical examination: There is granular swelling and disintegration of the epithelial cells, of mild degree. *Débris* and casts in some tubules. Interstitial tissue, blood-vessels and tufts unaffected.

CASE IX.—Male, white, æt. 32. Insane three years—melancholia, ending in dementia. Tuberculosis pulmonum, with well-marked nephritic symptoms during late stage. Urine contained albumen, and many hyaline, nucleated, granular, fatty and epithelial casts.

*Autopsy.*—Tuberculosis of lungs. Tubercular ulcers in small intestine. Weight of heart 8½ ozs. Kidneys: Capsule non-adherent. Cortex pale yellow, its striæ invisible. Pyramids dark red. Weight of right 5⅜, of left 6⅛ ozs. Microscopical examination: A high grade of parenchymatous degeneration, with much *débris*, and casts in situ. No further lesion.

CASE IX.—Female, white, æt. 34. Acute melancholia, with delirium of seven weeks' duration, following severe bodily injury, with traumatic pneumonia. Urine contained a small amount of albumen and some hyaline and faintly granular casts. Death preceded by somnolence and coma.

*Autopsy.*—Cerebral congestion. Lower lobe of one lung consolidated. Weight of heart 8½ ozs. Kidneys: Capsule non-adherent, cortex pale, striæ visible, pyramids dark—cyst in right. Weight of each 6¼ ozs. Microscopical examination: Granular swelling and disintegration of tubal epithelium. Proliferation of endothelial cells lining Bowman's capsule. Fat globules, *débris* and many casts in tubules. No interstitial thickening, and no disease of vessels.

CASE XI.—Female colored, æt. 36; melancholia eighteen months; tuberculosis pulmonum, with, toward the end, nephritic symptoms.

*Autopsy.*—Tuberculosis of lungs, pleuræ, peritonæum, intestines, lymph nodes, liver and spleen. Kidneys: Capsule non-adherent, cut surface pale, granular; cortical striæ invisible; weight of right 5, of left 4⅞ ozs. Microscopic examination: A slight degree of intertubular round-cell infiltration; the walls of some of the blood-vessels show slight thickening; tufts are normal; epithelial cells are granular and swollen; in some tubules disintegrated and lumen choked with *débris* and casts; no tubercular disease discovered.

CASE XII.—Male, white, æt. 57; epileptic demetia; stupor for several days before death.

*Autopsy.*—Cerebral congestion, tuberculosis of lungs (a few scattered nodules); weight of heart 13⅝ ozs. Kidneys: Capsule non-adherent, striæ visible, and general appearance of the organs that of comparative health. Microscopical examination: Intense congestion of blood-vessels, these, even to the smallest, being distinctly shown thoroughout the organ by means of the contained mass of corpuscles, most marked in left kidney; epithelial cells granular, and in a few tubes disintegrating; some casts in the tubules; no further abnormality.

CASE XIII.—Negro, man, æt. 29; epileptic dementia, with occasional excitement, often stupid for days at a time; convulsions and coma preceded death (possibly uræmic); urine contained, on the day of his death, albumen, red blood cells and enormous numbers of hyaline, granular, fatty and nucleated casts.

*Autopsy.*—Cerebral congestion; weight of heart 8¼ ozs. Kidneys: Dark, firm; capsule adherent; cortex reddish brown, its striæ invisible; pyramids also dark-colored; much blood exudes; right weighs 5, left 5½ ozs. Miscroscopic examination: A high degree of cellular disinteration; most of the tubules containing only shapeless masses of granular matter and casts; proliferation of cells lining Bowman's capsule; other structures fairly normal; the left kidney shows the change described in a greater degree than the right.

CASE XIV.—Negro, man, æt. 46; mania one year; œdema and gastro-intestinal symptoms well marked; somnolence and stupor preceding death.

*Autopsy.*—Cerebral atrophy; weight of heart 8¾ ozs. Kidneys: Soft; capsule adherent; cortex dark red, granular; its striæ invisible in left, faintly seen in right; small areas of round-celled infiltration are found upon microscopical examination, as also thickening of arterial walls, and a slight granular swelling of tubal epithelium; some of the tufts and a few small arteries give an amyloid reaction; weight of right 3¾, of left 3⅛ ozs.

CASE XV.—Male, white, æt. 34; insane ten years; epileptic dementia with periods of maniacal excitement; somnolence and stupor preceded death; urine contained albumen, and hyaline and waxy casts; quantity varied.

*Autopsy.*—Cerebral congestion; heart 8¼ ozs. Kidneys: Firm, dark red; capsule adherent; cortex thinned; its markings invisible; right weighs 3¾, left 4⅛ ozs. Microscopical examination: Areas of intertubular thickening and round-celled infiltration; walls of a few arteries and a few Malpighian tufts give an amyloid reaction, as do some of the casts in tubules; degenerative change in epithelial cells inconspicuous.

CASE XVI.—Female, white, æt. 33; epileptic since infancy, and intellectually deficient; had occasional œdema of face and the gastric disorder, diarrhœa, etc., of chronic nephritis; urine contained albumen, hyaline, granular, nucleated and, in later stages, epithelial casts; quantity varied greatly.

*Autopsy.*—No gross lesion of interest save that of kidneys; these organs are firm and dark-colored; capsule adheres throughout, and leaves a typically granular surface; cortex shows an apparent thickening; is dark red in color, granular, and its markings very indistinct; blood oozes freely from cut surface; weight of right 5½, of left 6¼ ozs. Microscopical examination: Cloudiness, swelling and some disintegration of tubal cells; casts and *débris* in the tubes; proliferation of the cells lining Bowman's capsule, with thickening of the walls of some tufts; little or no interstitial change.

CASE XVII.—Female, white, æt. 52; melancholia, with persecutory delusions, noise and irritability for four years; died two weeks after an attack of la grippe, with marked uræmic symptoms; urine was diminished in quantity and contained albumen and many casts, dark brown, coarsely granular ones especially numerous; the tubercular disease was not recognized during life.

*Autopsy.*—Cerebral atrophy; a few small tubercular nodules scattered through both lungs; a general endarteritis, the atheromatous disease in cerebral vessels well marked, weight of heart 6⅞ ozs. Kidneys: Capsule adheres; cortex is dark reddish-brown; its striæ invisible; the pyramids are pale; a small one-eighth inch in diameter tubercular spot in left; right weighs 4⅛, left 4½, ozs. Microscopical examination: Uniform thickening of capsule; numerous and extensive areas of round-celled infiltration and intertubular thickening; walls of arteries thickened, extreme degenerative change in glandular epithelium; lumen of tubules choked with *débris;* numerous and large casts in situ.

CASE XVIII.—Male, white, æt. 22; insane two years; acute melancholia, with great exhaustion and emaciation; died a few days after admission; no examination of urine; symptoms of bodily disease indefinite.

*Autopsy* showed all organs, kidneys included, approximately normal in gross appearance. Microscopical examination of kidneys: Uniform thickening of capsule, and a well-defined parenchymatous degeneration; vessels and interstitial tissue unaffected.

CASE XIX.—Female, negro, æt. 47; demented many years, tuberculosis pulmonum, with few if any symptoms of renal disease beyond the presence of albumen and casts in the urine.

*Autopsy.*—Tuberculosis of lungs, intestines, and a tubercular peritonitis. Kidneys: Capsule very slightly adherent; cortex pale; striæ indistinct; pyramids dark; weight of right 3½, of left 3¼ ozs. Microscopic examination: Capsule shows localized thickening; some intertubular thickening, and distinct thickening of all the coats of the smaller arteries; masses of desquamated epithelial cells in some tubules, and a good deal of disintegration and granular swelling of nearly all the cells in convoluted tubes; here and there a slight amyloid reaction is obtained.

CASE XX.—Male, white, æt. 55; recurring maniacal attacks during several years, ending in dementia; died of septicæmia; urine was of low specific gravity, and increased in quantity, but usually contained no albumen and no casts.

*Autopsy.*—Cerebral atrophy; slight arterial sclerosis; metastatic abscesses in lungs; fatty infiltration of liver; heart 7 ozs. Kindeys: Pale, firm; capsule non-adherent; cortex shows numerous pale, homogeneous semi-transparent spots; between these it is granular, and striæ are obscured; small cyst in left; right weighs 3½, left 4¼ ozs. Microscopical examination: Numerous areas of round-celled infiltration, increase in number of nuclei in Malpighian coils. Outer coats of arteries are thickened; there are extensive regions of amyloid degeneration; tubal epithelium granular and swollen; but there is little breaking down, and no *débris* or casts are found.

CASE XXI.—Female, white, æt. 19; chronic melancholia of three years' duration; tuberculosis pulmonum; with, during last four months, great œdema of face and lower extremities; urine contained albumen and large numbers of hyaline and granular casts; quantity varied, but was usually diminished.

*Autopsy.*—Tubercular disease of lungs; small intestine and lymph nodes; fatty infiltration of liver; weight of heart 4¾ ozs. Kidneys: Capsule non-adherent; cortex pale yellow, with which the dark red pyramids and striæ are in brilliant contrast; weight of right 3¼, of left 3⅝ ozs. Microscopical examination: Tubal epithelium swollen, granular, disintegrating; cast matter in many tubules; the lesion is purely parenchymatous.

CASE XXII.—Female, white, æt. 63; chronic melancholia with dementia, twelve years; tuberculosis pulmonum, with œdema and other symptoms of a renal complication; urine was increased in quantity and contained albumen and many casts.

*Autopsy.*—Cerebral atrophy, tuberculosis of lungs, and tubercular ulcers in small intestine; a general endarteritis chronica; weight of heart 5½ ozs. Kidneys: Pale, soft; capsule locally adherent; cortex thinned, pale; striæ invisible; pyramids also pale and small; weight of right 3¼; of left 4¼ ozs. Microscopical examination: Thickening of intertubular tissue and capsule; many Malpighian tufts destroyed, and some thickening of the walls of all; casts and *débris* in the tubules, and a slight granular and disintegrative change in the epithelial cells; walls of all arteries thickened, the intima most conspicuously affected.

CASE XXIII.—Female, white, æt. 27; insane eight years; melancholia with persecutory delusions, and periods of depression progressing to dementia; tuberculosis pulmonum with symptoms of a kidney complication; urine was diminished in quantity, and contained a small amount of albumen with some hyaline and granular casts.

*Autopsy.*—Cerebral atrophy, tubercular disease of lungs and intestinal tract, with fatty infiltration of liver. Kidneys: Pale, firm; capsule adherent; cortex thinned; its striæ obscured; weight of right 3, of left 3¼ ozs. Microscopical examination: Thickening of capsule; intertubular round-celled infiltration and connective tissue hyperplasia; thickening of capsules of Malpighian tufts; a slight degree of parenchymatous change in tubal epithelium, most distinct in left kidney; some *débris* and cast matter in a few tubules; blood-vessels unaffected.

CASE XXIV.—White, female, æt. 67; demented thirty-seven years; had a chronic nephritis, with occasional slight œdema; death preceded by stupor of two days' duration.

*Autopsy.*—Atrophy of brain; first stage of pneumonia in lower lobe of one lung; a general endarteritis chronica, cerebral arteries participating; weight of heart 7 ozs. Kidneys: Capsule adherent, leaving a highly granular exterior after removal; cortex dark red and granular; its markings obscured; each organ weighs 4½ ozs. Microscopical examination: Great thickening of capsule; a high degree of round-cell infiltration and intertubular thickening; many Malpighian tufts destroyed, and distinct thickening of capsules of those remaining; tubal epithelium swollen and granular, and in some tubules broken down and converted into irregular masses of *débris;* hyaline casts in situ, some of which exhibit an amyloid reaction, as do also a few of the Malpighian coils and walls of some of the smaller arteries; all arterial walls are more or less thickened, the intima being the seat of most extreme change.

CASE XXV.—Male, colored, æt. 27; secondary paranoia of two years' duration; three epileptiform convulsions six months before death (uræmic?); tuberculosis pulmonum; urine contained albumen and hyaline and granular casts.

*Autopsy.*—Tuberculosis of lungs; slight arterio-sclerosis. Kidneys: Capsule adherent, and leaves a very granular, uneven surface after removal; cortex dark, its striæ faintly visible and somewhat tortuous; weight of right 3½, of left 4½ ozs. Microscopical examination: Extensive intertubular thickening; some Malpighian tufts destroyed; walls of the smaller arteries thickened, the outer coats as well as the intima; cloudy swelling and slight disintegration of the tubal epithelium; *débris* and cast matter in some tubules.

Of the above twenty-five examinations not one can be said to show a strictly normal kidney; but it is to be doubted if the histologically perfect kidney can be found in any person dying after middle life, and nephritis of mild degree is a so constant accompaniment of acute disease that especial importance cannot attach to slight intertubular thickening and the milder grades of parenchymatous metamorphosis. It will be readily seen, however, that approximately three out of four of the kidneys examined show serious and extensive disease. The study has been continued through about one hundred autopsies, with results of which the above cases may be taken as a fair synopsis.

The question of the relation between insanity and renal inadequacy is one of paramount importance, toward the solution of which the discovery of the frequent co-existence of the two conditions is but a single step. Assuming that the manifestations of mind, be they normal or abnormal, are dependent upon cell activity, and that cell activity is modified by cell environment, a natural and necessary connection between the two is so apparent as to render useless any extended discussion of this point. It follows that the circulation in the blood of deleterious agents of whatever source and nature, as well as the abstraction from the blood of any of the ingredients essential to normal nutrition is inevitably succeeded by perversion or diminution of cell activity, the outward visible sign of such perversion or diminution in case of the cells of the cortex cerebri being a lowering of intellectual capacity more or less pronounced, or derangement of normal mental balance. Any pathological process possessing the potency of renal disease in inducing tissue mal-nutrition would exert an equal influence in the genesis of mental aberration; but when the supreme importance of the kidney as an organ of elimination is considered it will be readily seen that its diseased states are most especially liable to be followed by contamination of the nutritive current. It seems to me not improbable that the psychic manifestations of other maladies—the fevers, tuberculosis, etc.—are due in part at least to retention of the products of disease and tissue waste by reason of failure on the part of the kidneys to perform their full duty.

That disease of the kidney is the primary lesion in the cases showing mental alienation as a symptom cannot in many instances be proven. In some at least the renal disease and cerebral disorder are concurrent effects of a common cause; and in the arterio-sclerotic forms disease of the cerebral arteries enters as a complicating factor. It nevertheless appears reasonable to suppose that however caused, whenever fully established and whatever its nature, the existence of nephritic disease with consequent interference with the function of the gland cannot but exert an at least modifying influence upon the mental state of the individual.

The general impression among those who have studied the subject is that insanity accompanying disease of the kidney is prone to assume the form of melancholia, and this I am not prepared to dispute. It has been suggested[4] that in an organism predisposed by inheritance to a ready derangement of the intellectual faculties; disease of rapid onset tends to induce as a result of this action upon the cortical cells some form of maniacal excitement, whereas pathological process of slow and insidious development are apt to be accompanied by a depressive neurosis. If this opinion be accepted as even partially true, the great preponderance of chronic nephritis affords a rational explanation of the frequency of melancholia in such cases. It is to be borne in mind, however, that it is not in melancholia alone that renal disease is found. It is frequent in acute maniacal excitement, and well-nigh universal in puerperal, opium and alcoholic cases, whatever form the mental symptoms assume.

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[4] Dr. J. Batty Tuke, in British Medical Journal, May 30, 1891.

It was my intention in the beginning to give in detail such cases of interest as the material at hand should offer, but their number has grown so large, and the necessity for observation during long periods so apparent, that I shall content myself with directing attention to this very promising field of clinical research, and reserve the further discussion of the subject should the results of continued study seem to warrant this course, for a future report.

## NOTE ON THE CONNECTION WITH NERVE CELLS OF THE VASO-MOTOR NERVES FOR THE FEET.

J. N. Langley (Journal of Physiology, Vol. xii., No. 4, 1891). The chief conclusion in this note is that studies on dogs an cats show the vaso-constrictor, vaso-dilator and the secretory fibres for a given region to be associated with nerve-cells in the same ganglia. This gives us an anatomical grouping which is certainly correlated with the association of these physiological processes.

H. H. D.